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EPA Superfund
Record of Decision:

MADISON METROPOLITAN SEWERAGE DISTRICT LAGOONS
EPA ID: WID078934403
OU 01
BLOOMING GROVE, WI
03/31/1997

<IMG SRC 97156>

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

Madison Metropolitan Sewerage District Lagoons
Madison, Wisconsin

STATEMENT OF BASIS AND PURPOSE

This decision document represents the selected remedy for the Madison Metropolitan Sewerage District Lagoons Site, Madison, Wisconsin, which was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

This decision is based upon the contents of the administrative record for the Madison Metropolitan Sewerage District Lagoons Site.

The State of Wisconsin has indicated their intent top concur with this Record of Decision. Their letter of concurrence is in process and will be attached to the Record of Decision when executed.

ASSESSMENT OF THE SITE

Actual or the threatened releases of hazardous substances from the site, if not addressed by implementing the response action selected in the Record of Decision (ROD), may present an imminent and substantial endangerment to public health, welfare, or the environment.

DESCRIPTION OF THE REMEDY

This final remedy addresses remediation of sludge containing hazardous substances by installation of an in-place vegetative/soil cover in order to minimize potential exposure to lagoon sludge by human and ecological receptors.

The major elements of the remedy include:

- Construction of intra-lagoonal dikes in order to segregate sludge with polychlorinated biphenyl (PCB) concentrations equal to or exceeding 50 parts per million (ppm);
- Placement of geotextile layer and lightweight soil cover;
- Seeding with appropriate vegetative growth; vegetative cover and integrity of all dikes; and
- Continuation of the institutional controls described for alternative RA-2.

STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost effective. This remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable. However, because treatment of the principal threat at the site was not found to be practicable, this remedy does not satisfy the statutory preference for treatment as a principal element of the remedy. The large volume of material containing relatively low levels of contamination and the fact that there are no on-site hot spots that represent the major sources of contamination preclude selecting a remedy in which the contaminant of concern could be excavated and treated effectively.

Because this remedy will result in hazardous substances remaining on site above health-based levels, a review will be conduct five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

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SUMMARY OF REMEDIAL ALTERNATIVE SELECTION
MADISON METROPOLITAN SEWERAGE DISTRICT LAGOONS SITE
MADISON, WISCONSIN

I. SITE NAME, LOCATION AND DESCRIPTION

The Madison Metropolitan Sewerage District (MMSD) Lagoon Site consists of two sludge lagoons that are located adjacent to the treatment plant facilities, south of the city of Madison in Dane County, Wisconsin. The lagoons are referred to as Lagoon 1 and 2. Figure 1 depicts the orientation of the sludge lagoons with regard to the overall MMSD plant.

Lagoon 1 is divided by several cross-dikes (Figure 2) and covers an area of approximately 52 acres. Three dikes run in a north-south direction, effectively dividing Lagoon 1 into four subsections. The easternmost of these four sub-sections is termed Lagoon 1B and the rest, (the three westernmost sub-sections) Lagoon 1A. Lagoon 1B is further subdivided into four sections by three dikes that run in an east-west direction. All sludge and a portion of the underlying peat have been removed from Lagoon 1B and a portion of Lagoon 1A (i.e., the first sub-section immediately adjacent to, and west of Lagoon 1B). All materials were sampled and analyzed for PCBS during the removal process to ensure compliance with applicable requirements, and beneficially reused in MMSD's sludge recycling program. Sludge with PCB concentrations less than 50 ppm are used in the recycling program. The water level is maintained in the cleaned out sections of the Lagoon in order to control weed growth.

Lagoon 2 covers an approximate area of 86 acres and is divided into three sections by two earthen dikes that run in an approximately northeasterly-southwesterly direction (Figure 2). The westernmost third is termed Lagoon 2A while the eastern two-thirds are collectively termed Lagoon 2B. Sludge with PCBS greater than or equal to 50 ppm is contained within Lagoon 2A and portions of Lagoon 2B.

Surface waters that border the lagoons include Nine Springs Creek, an old drainage ditch (referred to as the North Ditch), which is a former effluent channel for the treatment plant, and several other drainage ditches that flow into Nine Springs Creek. Nine Springs Creek flows along the south and east borders of Lagoon 2. The creek flows into the Yahara River. The old drainage ditch borders the northern sides of both lagoons and connects with Nine Springs Creek near the northeastern corner of Lagoon 2. Wetlands, farms, parks, and open-space land exist immediately to the north, east, and south of the lagoons as shown on Figure 1. Land use to the northwest of the sludge lagoons is both commercial and industrial while to the west and southwest, land use is primarily residential.

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II. SITE BACKGROUND

MMSD has operated the Nine Springs Wastewater Treatment Plant (Nine Springs Plant) since 1933. In 1942, a 52-acre sludge lagoon (Lagoon 1) was constructed by MMSD. This lagoon was constructed in a marsh area to the east of the Nine Springs Plant with the dikes being constructed of imported fill material. By the mid-1960s, as Lagoon 1 began approaching its sludge capacity, MMSD constructed a second 86-acre lagoon (Lagoon 2) to the east of Lagoon 1. The dikes for Lagoon 2 were constructed of dredged surface soil and peat, obtained from the area of construction.

In April 1970 a portion of the north dike of Lagoon 2 collapsed and approximately 85 million gallons of lagoon contents was released into the adjacent ditch. The dike was subsequently repaired. In November 1973, dike subsidence occurred along the south side of Lagoon 2. Following repair of the south dike, MMSD curtailed active use of Lagoon 2. Details of the dike failure and subsidence and results of investigation of the release are included as appendix 1A of the Remedial Investigation (RI).

A Facilities Plan, prepared during the mid-1970s in accordance with Section 201 of the Federal Water Pollution Control Act of 1972, recommended reuse of the sludge by beneficially recycling the material to agricultural land. The plan considered removal of all sludges from Lagoon 2 and a portion of Lagoon 1, with the subsequent return of these areas to their natural state. The plan included use of the western portion of Lagoon 1 for winter storage of sludge and sludge dewatering.

The Facilities Plan included the sludge recycling program that is currently referred to as the Metrogro program. During development of the sludge recycling program, as part of a sludge monitoring sampling effort, PCBS were detected in the sludge lagoons. The sludge monitoring program was subsequently modified to include routine analysis for PCBS.

In 1982, analysis of a sludge sample from the lagoons first showed the presence of PCBS at a dry weight concentration exceeding 50 ppm. The 50 ppm PCB level represents the upper concentration limit for land application under the Toxic Substances Control Act (TSCA). Further sampling revealed that other areas of the lagoon system contained sludge with PCB concentrations above 50 ppm.

Between 1983 and 1986, U.S. EPA acting under the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) evaluated the lagoons for potential inclusion on the National Priorities List (NPL). On the basis of these evaluations the site was placed on the NPL in February 1990. Under an Administrative Order on Consent issued September 24, 1992 MMSD has undertaken a Remedial Investigation/Feasibility Study (RI/FS) for the site.

During the spring and summer of 1991, cleanout/closure activities were conducted in Lagoon 1B. Three cross dikes were constructed to aid in the removal of sludge and peat. All sludge and a portion of the peat underlying the sludge, were removed from Lagoon 1B. The sludge, which had PCB concentrations less than 50 ppm, was recycled to agricultural lands and the peat was used as a soil conditioner on lands owned by MMSD.

Lagoon 1A was used for the temporary storage of currently produced sludge and continued to serve this function until construction of new tank storage facilities was completed at the end of 1993. Two cross-dikes were constructed in Lagoon 1A during 1992 and 1993 to aid in cleanout/closure activities in a portion of the Lagoon. Closure of an approximately 10-acre portion at the east end of Lagoon 1A was completed in mid-1993. A water cover is maintained over the closed portions of Lagoon 1A to control week growth.

Closure of additional portions of the lagoons was temporarily halted in 1994 in response to a request by United States Environmental Protection Agency (U.S. EPA) to stop land application of all lagooned sludge until EPA had an opportunity to review available information and determine the consistency of land application relative to response actions taken under the Superfund Program. In a letter dated March 28, 1995, U.S. EPA withdrew its restriction of land application of lagoon sludge containing PCBS at concentrations less than 50 ppm (i.e., Lagoons 1A and portions of Lagoon 2B), stating that this action would not be inconsistent with future response actions at the site. Lagoon 2B cleanout and closure will be performed in those portions of Lagoon 2B that contain PCBS below 50 ppm beginning in 1997.

The future land use of the MMSD lagoons is expected to remain unchanged. The lagoons are no longer receiving sludge from the treatment plant, and sludge is gradually being removed from some of the lagoons for use in the land application program. Residential and/or commercial development of the areas immediately adjacent to the lagoons is not anticipated. This is because most of the land surrounding the lagoons is wetlands, and is considered part of the Dane County Environmental Corridor.

Regional Geology

The MMSD Site is located in the Eastern Ridge and Lowlands Province physiographic region. Glaciation resulted in the formation of numerous kettle lakes and disruptions of pre-glacial drainage, thereby creating marshlands. The geologic profile generally consists of marsh and lacustrine units (peat, marl, clay, and silt) followed by interbedded glacial units of lacustrine clay and silt, outwash (sand and gravel), and till (silty sand with gravel) deposits. The Cambrian bedrock beneath the site is Sandstone. Underlying the Cambrian bedrock is Precambrian crystalline rock.

The bedrock depth below ground surface in the general vicinity of the site varies from less than 100 feet to over 200 feet along the deepest parts of the preglacial valley. In closure proximity to the site, well logs indicate that depth to bedrock is 95, 180, and 100 feet below ground surface.

a. Regional Hydrogeology

In the Madison area, groundwater discharges to the lakes and the Yahara River. In Dane County, groundwater is released from the subsurface via springs and seeps into streams and lakes, as well as by evapotranspiration and pumpage. Wetland deposits may be saturated, but are not a source of potable water for wells in Dane County. The glacial deposits, including outwash and alluvium, morainal deposits, glacial lake deposits, and undifferentiated glacial deposits yield varying quantities of water to wells, depending upon the location and lithology of the deposit. The deposits of drift, outwash and alluvium in the Yahara River valley provide a thick reservoir for ground water. The Cambrian sandstone bedrock is a single water-yielding unit. Even though there are hydraulic interconnections between the Cambrian sandstone units, there are water- yielding zones that may be perched, or partially confined due to heterogeneities in the rock such as shale beds and preferential permeability zones. The Cambrian sandstones form the principal aquifer and provide the major source of ground water for wells in Dane County.

In some areas, unconfined aquifer conditions exist. In other areas of eastern Dane County, ground water is partially confined by glacial till. Underlying the Cambrian bedrock are Precambrian crystalline rocks which are not water yielding, and form the base of the groundwater reservoir in Dane County.

The regional flow in the vicinity of the site is from west to east towards the Yahara River system. The ground-water potentiometric surface reflects topography, with deep water levels under hills and shallow levels in the valleys.

The potentiometric surface for ground water in the unconsolidated deposits is generally related to topography, but due to the potential for disconnected units and/or short ground-water flow paths, the ground-water flow directions may be more localized than those of the bedrock aquifer. With no pumpage, the site is a natural discharge area for regional ground-water flow, in both the unconsolidated and bedrock units. The ground water discharged in the Madison area is derived solely from the Yahara River ground-water basin. In Dane County, movement of ground water under natural conditions is extremely slow, so that movement of a few tenths of a foot per day is common.

b. Local Ground-Water Use

There are two municipal wells upgradient of the MMSD Site. These wells provide water for the Cities of Madison and Monona (see Figure 1). The City of Monona Well No. 3 is located at the corner of Raywood Road (now known as South Towne Drive) and Highways 12 and 18 approximately 3,600 feet north-northwest of the site. the second well, City of Madison Well No. 5, is located approximately 1,300 feet west of the site. This well is drilled to a total depth of 827.9 feet.

Two private wells were identified within 500 feet of the site. The wells are located upgradient from the lagoons, to the south of Lagoon 1A.

III. SUMMARY OF SITE CHARACTERISTICS

Investigative activities undertaken at the Site since 1990 include the phased RI, followed by a resampling of Lagoon 2B that was requested by the EPA. Summaries of both activities are provided below.

Remedial Investigation Summary

The RI sampling was initiated in October 1990, using a phased approach involving an initial Preliminary Field

Investigation (PFI), and a more focused Comprehensive Field Investigation (CFI).

During the PFI, sludge cores and supernatant were collected from the lagoon system and analyzed for constituents on the Target Compound List (TCL) and Target Analyte List (TAL), plus 30 (+30) other tentatively identified organic compounds (TICs). The sludge cores were also analyzed for total organic carbon (TOC), total solids (TS), total volatile solids (TVS), and particle size distribution. Temperature, pH, and conductivity were determined for the lagoon supernatant.

During the CFI, sludge, underlying lagoon peat, nearby surface waters, ground water, and nearby stream sediments were sampled. These samples were selectively analyzed, as appropriate, for combinations of the individual parameters analyzed during the PFI. The results of these sampling efforts were presented and evaluated in the draft RI Report submitted to EPA in January 1992. the PFI and CFI collectively, have subsequently been referred to as the Phase I RI.

In response to EPA request, additional sampling of Nine Springs Creek and North Ditch sediment, soil from wetlands north and south of the lagoons, and ground water from three new well/piezometer clusters was conducted. The creek and ditch sediments, and wetland soils were analyzed for PCBS, TOC, and TAL constituents. Summary results are shown in Table 1. Groundwater samples were analyzed for TCL pesticide compounds and for PCBS. No PCBS or pesticides were detected in these samples.

As discussed in the final RI Report, sampling results indicate that ground water is not affected by the lagoon sludge constituents because the range of up gradient (background) concentrations are generally comparable to those reported in ground-water samples obtained from down gradient locations. The RI results also indicated that the sludge lagoons have not affected either the wetland soils (Table 2) adjacent to the site or the surface water (Table 3) of Nine Springs Creek or the North Ditch. Similarly, the RI inorganics results did not indicate any apparent site-related impacts on sediments in Nine Springs Creek, and the sources(s) of organics to the sediment could not be determined, due to infrequent detection and low concentrations. Additional details concerning these sampling programs and results are provided in the RI report.

TABLE 1

Inorganic Analytes in Ground-Water Samples

Inorganic Analytes	Observed Range, ppm		No. of Samples Exceeding the SDL/Total Analyzed	
	Unfiltered	Filtered	Unfiltered	Filtered
Aluminum	ND - 68.6	ND	5/6	0/6
Arsenic	ND - 0.0253	ND - 0.025	2/6	1/6
Barium	B - 1.01	--	2/6	0/6
Beryllium	--	ND	0/6	0/6
Calcium	20.7 - 684	18.6 - 171	6/6	6/6
Chromium	ND - 0.101	ND	2/6	0/6
Cobalt	--	ND	0/6	0/6
Copper	ND - 0.207	--	2/6	0/6
Iron	0.287J - 97.2	ND - 0.230J	6/6	1/6
Lead	B - 0.0261	--	2/6	0/6
Magnesium	10.7 - 188	9.43 - 87.4	6/6	6/6
Manganese	0.0846 - 3.18	0.0688 - 1.18	6/6	6/6
Mercury	ND - 0.00028	--	2/6	0/6
Nickel	ND - 0.114	ND	2/6	0/6
Potassium	B - 16.4	--	2/6	0/6
Selenium	ND - 0.0203	--	1/6	0/6
Sodium	13.6 - 153	--	6/6	6/6
Vanadium	ND - 0.180	ND	2/6	0/6
Zinc	BQL - 0.530	R	2/6	NA

Notes:

ND Not detected
SDL Sample detection limit
Notes (cont'd)
-- All values are either estimated or reported as not detected
J Data estimated as a result of validation
B Concentration between CRDL and IDL
NA Not available
R Data rejected as a result of validation
BQL Below sample quantitation limit
CRDL Contract Required Detection Limit
IDL Instrument Detection Limit

TABLE 2

Inorganic Analytes in Wetland Soil Samples

Inorganic Analytes	North Wetland Soil Observed Range (ppm)	North Wetland Soil No. of Samples Exceeding the SDL/Total Analyzed	South Wetland Soil (background) Observed Range (ppm)	South Wetland Soil (background) No. of Samples Exceeding the SDL/Total Analyzed
Aluminum	2,580 - 5,470	5/5	4,410 - 16,300	4/4
Arsenic	B - 9.9	1/5	B - 8.8	2/4
Barium	B - 153	1/5	B - 206	3/4
Calcium	18,300 - 206,000	5/5	10,600 - 22,400	4/4
Chromium	B - 94	1/5	B - 109	3/4
Copper	--	0/5	B - 15.7	2/4
Iron	6,440 - 14,500	5/5	6,180 - 23,100	4/4
Lead	10.3J - 90.0J	5/5	26 5J - 57.3J	4/4
Magnesium	B - 5.090	1/5	B - 4,350	3/4
Manganese	88.1 - 540	5/5	207 - 645	4/4
Nickel	ND	0/5	ND - 17.2	1/4
Selenium	ND,R	NA	BJ,R	NA
Vanadium	--	0/5	B - 41.1	2/4
Zinc	22.1J - 80.6J	5/5	48.7J - 99.6J	4/4
Cyanide	ND - 0.98	3/5	0.33 - 0.69	4/4

Notes:

--	All values were either estimated or reported as not detected
ND	Not detected
NA	Not available
B	Concentration between the CRDL and IDL
J	Data estimated as a result of validation
SDL	Sample Detection Limit
CRDL	Contract Required Detection Limit
IDL	Instrument Detection Limit
R	Data rejected as a result of validation

WETLAND SOIL SAMPLING RESULTS FOR PCBS AND TOC (PHASE II)

Location		N. Wetlands	N. Wetlands	N. Wetlands	N. Wetlands	N. Wetlands	S. Wetlands	S. Wetlands	S. Wetlands	S.Wetlands
Sample No.		WNM001S	WNM002S	WNM003S	WNM004S	WNM005S	WSM006S	WSM007S	WSM008S	WSM009S
Sample Date		5/20/93	5/20/93	5/19/93	5/19/93	5/19/93	5/20/93	5/20/93	5/20/93	5/20/93
Sample Segment (II)		0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
Sediment Depth (II)		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
PCBS (mg/kg)										
Correction Factor		2.4	4.7	6.9	4.7	9.2	2.9	2.2	3.4	6.0
	CRQL									
Aroclor 1016	0.05	U	U	U	U	U	U	U	U (U)	U
Aroclor 1221	0.05	U	U	U	U	U	U	U	U (U)	U
Aroclor 1232	0.05	U	U	U	U	U	U	U	U (U)	U
Aroclor 1242	0.05	U	U	U	U	U	U	U	U (U)	U
Aroclor 1248	0.05	U	U	U	U	U	U	U	U (U)	U
Aroclor 1254	0.05	U	U	U	U	U	U	U	U (U)	U
Aroclor 1260	0.05	U	U	U	U	U	U	U	U (U)	U
Total PCBS		U	U	U	U	U	U	U	U (U)	U
TOC										
% TOC		21.3	31.4	36.4	26.4	34.8	18.8	12.0	29.2 (28.3)	43.7

Notes:

U = Not detected. The sample specified quantitation can be determined by multiplying the CRQL by the sample correction factor
( ) = Duplicate analysis
CRQL = Contract Required Quantitation Limit
TOC = Total Organic Carbons

TABLE 3

Inorganic Analytes in Surface Water Samples

Inorganic Analytes	Nine Springs Creek Surface Water		North Ditch Surface Water	
	Observed Range, ppm, (including background)	No. of Samples Exceeding the SDL/Total Analyzed	Observed Range, ppm (including background)	No. of Samples exceeding the SDL/Total Analyzed
Aluminum	0.536 - 0.735	4/4	ND - 0.632	2/3
Arsenic	0.0011 - 0.0025	4/4	0.0032 - 0.0039	3/3
Barium	--	0/4	0.00635 - 0.007	3/3
Calcium	68.6 - 70.2	4/4	84 - 112	3/3
Iron	1.07 - 1.68	4/4	0.73 - 5.5	3/3
Lead	ND - 0.0084	2/4	ND - 0.0041	1/3
Magnesium	33.4 - 35	4/4	36 - 44.6	3/3
Manganese	0.128 - 0.19	4/4	0.26 - 0.305	3/3
Sodium	13.6 - 15.2	4/4	29.6 - 41.3	3/3
Zinc	0.0317 - 0.048	4/4	0.03 - 0.044	3/3
Cyanide	ND - 0.06	1/4	ND - 0.07	1/3

Notes:

-- All values are either estimated or reported not detected.
ND Not Detected.
SDL Sample Detection Limit.

SURFACE WATER SAMPLING RESULTS FOR PCBS

Location		N.S. Creek	N.S. Creek	N.S. Creek	N.S. Creek	N. Ditch	N. Ditch	N. Ditch
Sample No.		NSW002S	NSW003S	NSW005S	NSW008S	NDW010S	NDW014S	NDW016S
Sample Date		4/30/91	4/30/91	4/30/91	4/30/91	4/30/91	4/30/91	4/30/91
PCBS (Ig/L)								
Correction Factor		1.0	1.0	1.0	1.0	1.0 (1.0)	1.0	1.0
	CRQL							
Aroclor 1242	0.05	U	U	U	U	U (U)	U	U
Aroclor 1254	0.05	U	U	U	U	U (U)	U	U
Aroclor 1260	0.05	U	U	U	U	U (U)	U	U
Total PCBS		U	U	U	U	U (U)	U	U

Notes:

( ) = Duplicate analysis
CRQL = Contract Required Quantitation Limit
U = Not detected. The sample specific quantitation limit can be determined by multiply the CRQL by the sample correction factor.

Lagoon Sludge

During the Phase I RI, a total of 35 sludge core samples and five surficial sludge samples (0 to 6 inches) were collected and analyzed for TCL/TAL+30 constituents (Table 4). Although sludge samples were collected from throughout the lagoon system and prior to the construction of some of the currently-existing cross-dikes, the only sludge data discussed here are chemical concentrations in Lagoon 2A. This is due to the fact that sludge in Lagoon 2A has PCB concentrations above 50 ppm, which are regulated under TSCA. The sludge in Lagoon 1A and most of Lagoon 2B meets all the criteria for beneficially recycling to agricultural land, consistent with U.S. EPA Standards (40 CFR 503) and the State of Wisconsin (NR 204) sewage sludge management regulations. Consistent with the regulations, U.S. EPA (1995a) granted official approval for beneficial recycling of Lagoon 1A sludge and Lagoon 2B sludge following further sampling. The subsequent sampling for Lagoon 2B indicated that most of the samples (20 out of 27) had PCB concentrations below 50 mg/kg. Sludge from these locations will be removed and land-applied as appropriate. Sludge from the remaining seven locations will be isolated within an extension of the Lagoon 2A dike. Results of this sampling are included in a letter report to U.S. EPA dated April 16, 1996.

Cleanout/closure operations are currently being conducted in Lagoon 1A, with a scheduled completion date of December 31, 1997. Cleanout/closure operations in Lagoon 2B will begin in 1997-1998.

The frequency of detection and range of detected concentrations for chemicals of concern in sludge from Lagoon 2A are presented in Table 3-1. Inorganic constituents were detected in Lagoon 2A sludge at varying concentrations. Several volatile organic compounds were also detected in sludge from Lagoon 2A, including acetone, carbon disulfide, 2-butanone, benzene, toluene, chlorobenzene, ethylbenzene, xylenes, and 1,2-dichloroethene. One semivolatile organic compound [bis(2-ethylhexyl)phthalate] also was detected in Lagoon 2A sludge. Two pesticide organics (4,4'-DDE and 4,4'-DDD) were detected in Lagoon 2A. PCBS were detected in each of the sludge samples from Lagoon 2A, with a maximum total PCB concentration of 170 mg/kg.

Lagoon Peat

Following sludge removal from Lagoons 1B1 to 1B4, 32 peat samples were collected. Sample locations were distributed on a grid pattern, and the upper 2-inch segments of peat were analyzed for PCBS. In addition, eight of the peat samples were analyzed for inorganics and conventional parameters such as pH and total solids. Following sludge removal from Lagoon 1A3, 15 samples were collected along a grid pattern. Each of the 15 samples was analyzed for total PCBS, and four of the samples were analyzed for various inorganic constituents. A summary of the combined post-sludge-removal peat data for Lagoons 1B1 to 1B4 and Lagoon 1A3 and identification of the chemicals of concern are presented in Table 5. The inorganic constituents were generally detected in each of the peat samples at concentrations an order of magnitude lower than those detected in previous sludge samples from the lagoon area. Dry weight total PCB concentrations detected in the peat range from not-detected (<0.5 mg/kg) to 3.1 mg/kg.

TABLE 4

Inorganic Analytes in Sludge Samples

Inorganic Analytes	NSSS Observed Range (ppm)	Lagoon 1 Sludge Observed Range, ppm	Lagoon 1 Sludge No. of Samples Exceeding the SDL/Total Analyzed	Lagoon 2 Sludge Observed Range, ppm	Lagoon 2 Sludge No. of Samples Exceeding the SDL/Total Analyzed
Aluminum	NR	2,540 - 6,430	7/7	2,900 - 8,600	13/13
Antimony	NR	ND - 7.2	2/7	ND	0/13
Arsenic	0.3 - 316	ND - 14.2	6/7	ND - 18.3	10/13
Barium	NR	414 - 1,170	7/7	296 - 1,540	13/13
Beryllium	0.1 - 3.9	ND	0/7	ND - 4	1/13
Cadmium	0.7 - 8,220	8.3 - 35.7	7/7	13 - 50.3	13/13
Calcium	NR	38,400 - 82,600	7/7	26,600 - 78,700	13/13
Chromium	2.0 - 3,750	229 - 736	7/7	152 - 1,030	13/13
Iron	9.4 - 1,670	155 - 786	7/7	138 - 626	13/13
Magnesium	NR	183 - 451	7/7	152 - 534	13/13
Mercury	0.2 - 47	9 - 32.8	7/7	9 - 34	13/13
Nickel	2 - 976	ND - 76.3	3/7	ND - 75.2	4/13
Selenium	0.5 - 70	ND - 6.0	3/7	ND - 13.4	4/13
Silver	NR	61 - 200	7/7	45.7 - 216	13/13
Zinc	38 - 68,000	1,090 - 3,590	7/7	672 - 3,700	13/13
Cyanide	NR	ND - 3.8	6/7	ND - 8.97	12/13

Notes:

SDL Sample detection limit.
ND Not detected
NR Not reported
NSSS data from 1990 National Sewerage Sludge Survey (Black & Veatch, 1991)
The NSSS data represents sludge inorganic constituent ranges reported during the survey, and do not represent regulatory standards

Volatile Organic Compounds in Sludge Samples

Volatile Organic Compound	Lagoon 1 Sludge Observed Range. ppm	Lagoon 1 Sludge No. of Samples Exceeding the SQL/Total Analyzed	Lagoon 2 Sludge Observed Range. ppm	Lagoon 2 Sludge No. of Samples Exceeding the SQL/Total Analyzed
Methylene Chloride	ND - 0.086B	1/7	ND - 0.10B	1/13
Acetone	BQL - 5.6B	6/7	0.66 - 5.1B	13/13
Carbon Disulfide	ND - 0.14	1/7	ND - 0.088	3/13
2-butanone	ND - 1.2	4/7	0.062 - 1.0	13/13
Benzene	--	0/7	ND - 0.112	2/13
Toluene	BQL - 0.72B	5/7	BQL - 7.8B	10/13
Chlorobenzene	BQL - 0.24	3/7	ND - 0.19	4/13
Ethylbenzene	BQL - 0.33	2/7	ND - 0.57	5/13
Xylenes (total)	0.17 - 1.9	7/7	ND - 1.6	10/13

Notes:

-- All values are either estimated or reported as not detected.
ND Not detected.
B Found in blank of the sample result noted.
BQL Below the sample quantitation limit.
SQL Sample quantitation limit.

Pesticides in Sludge Samples

Pesticides	Lagoon 1 Sludge Observed Range, ppm	Lagoon 1 Sludge No. of Samples Exceeding the SQL/Total Analyzed	Lagoon 2 Sludge Observed Range, ppm	Lagoon 2 Sludge No. of Samples Exceeding the SQL/Total Analyzed
4,4'DDE	--	0/7	ND - 0.2	4/13
4,4'DDD	--	0/7	ND - 0.28	2/13

Notes:

SQL Sample quantitation limit.
-- All values are either estimated or reported as not detected.
ND Not detected.

SLUDGE CORE SAMPLING RESULTS FOR PCBS TS, TVS, AND TOC

	CRQL						
Sample No.		L2S001C	L2S002C	L2S003C	L2S004C	L2S005C	L2006C
Sample Date		11/12/90	11/13/90	11/13/90	11/13/90	11/13/90	11/13/90
Total Sludge Depth (ft):		2.7	1.8	2.0	3.8	3.1	2.0
Sludge Depth Sample (ft):		0-2.7	0-1.8	0-2.0	0-3.8	0-3.1	0-2.0
PCBS (mg/kg)							
Correction Factor		96.0	192.0	96.0	96.0	192.0	192.0
Aroclor 1242	0.025	5.8	10.0	3.4	4.2 (6.9)	14.0	8.3
Aroclor 1254	0.025	J	J	J	U (U)	U	U
Aroclor 1260	0.025	U	U	U	U (U)	U	U
Total PCBS		5.8T	10.0T	3.4T	4.2 (6.9)	14.0	8.6
SUPPLEMENTAL PARAMETERS							
% TS		8.65	4.08	5.19	9.96	3.01	9.47
% TVS		60.89	63.26	66.01	62.19	68.51	61.12
% TOC		28.02	26.78	27.58	26.16	31.51	24.56

	CRQL							
Sample No.		L2S007C	L2S008C	L2S008S	L2S009C	L2S010C	L2S011C	L2S011S
Sample Date		2/26/91	2/28/91	3/5/91	2/26/91	2/26/91	2/26/91	3/5/91
Total Sludge Depth (ft):		7.0	5.5	5.5	1.0	3.0	3.5	3.5
Sludge Depth Sampled (ft):		0-7.0	0-5.5	0-2.0	0-1.0	0-3.0	0-3.5	0-2.0
PCBS (mg/kg)								
Correction Factor		187.1	300.5	108.8	128.1	177.8	23.0	219.6
Aroclor 1242	0.025	60.0	110.0	39.0	50.0	65.0	8.3	46.0
Aroclor 1254	0.025	U	U	U	U	U	U	U
Aroclor 1260	0.025	U	U	U	U	U	2.1	U
Total PCBS		60.0	110.0	39.0	50.0	65.0	10.4	48.0
SUPPLEMENTAL PARAMETERS								
% TS		12.0	13.3	N/A	19.5	15.9	17.3	N/A
% TVS		62.5	N/A	N/A	N/A	N/A	56.2	N/A
% TOC		31.41	27.94	29.77	24.29	32.71	27.61	32.88

Sample No.	CRQL	L2S012C	L2S013C	L2S014C	L2S015C	L2S015S	L2S016C	L2S017C	L2S018C
Sample Date		2/26/91	2/26/91	2/26/91	2/27/91	3/5/91	2/27/91	2/27/91	2/27/91
Total Sludge Depth (ft):		4.0	4.0	5.0	4.5	4.5	4.0	3.5	1.0
Sludge Depth Sampled (ft):		0-4.0	0-4.0	0-5.0	0-4.5	0-2.0	0-4.0	0-3.5	0-1.0
PCBS (mg/kg)									
Correction Factor		171.5	147.8	419.6 (365.0)	167.5	243.0	162.9	179.9	129.9
	CRQL								
Aroclor 1242	0.025	52.0	49.0	170.0 (120.0)	36.0	69.0	57.0	47.0	28.0
Aroclor 1254	0.025	U	U	U (U)	U	U	U	U	U
Aroclor 1260	0.025	U	U	U (U)	4.3	U	J	U	U
Total PCBS		52.0	49.0	170.0 (12.0)	42.3	69.0	57.0T	47.0	28.0
SUPPLEMENTAL PARAMETERS									
% TS		11.7	13.5	14.3 (11.0)	11.9	N/A	15.4	11.1	7.7
% TVS		N/A	58.9	60.4 (60.7)	N/A	N/A	56.9	61.3	72.6
% TOC		21.92	26.38	30.57 (30.41)	26.53	26.60	28.37	26.69	32.51

Sample No.	CRQL	L2S019C	L2S020C	L2S021C	L2S022C	L2S023C	L2S024C	L2S025C	L2S026C
Sample Date		2/28/91	2/25/91	2/26/91	2/26/91	2/28/91	2/28/91	2/28/91	2/28/91
Total Sludge Depth (ft):		4.0	3.7	2.8	5.0	2.5	2.0	3.0	3.0
Sludge Depth Sampled (ft):		0-4.0	0-3.7	0-2.8	0-5.0	0-2.5	0-2.0	0-3.0	0-3.0
PCBS (mg/kg)									
Correction Factor		200.0 (40.)	355.6	246.8 (244.8)	16.7	10.8	7.2	12.2	2.4
	CRQL								
Aroclor 1242	0.025	12.0 (12.0)	33.0	53.0 (43.0)	5.5	3.8	3.0	1.8	2.4
Aroclor 1254	0.025	4.4 (4.2)	9.0	U (U)	U	U	U	U	U
Aroclor 1260	0.025	U (U)	U	U (U)	0.44	1.2	0.38	0.71	0.43
Total PCBS		16.4 (16.2)	42.0	53.0 (43.0)	5.94	5.0	3.38	2.51	2.83
SUPPLEMENTAL PARAMETERS									
% TS		7.85	9.29	8.13 (8.17)	5.99	9.28	13.80	8.19	9.48
% TVS		69.6	70.4	N/A (N/A)	77.1	N/A	N/A	N/A	78.5
% TOC		33.53	41.81	38.61 (26.36)	40.66	37.20	42.50	42.76	44.11

Lagoon Supernatant

During the PFI, an unfiltered composite supernatant sample was taken from Lagoon 2. The sample was a composite of five individual grab samples. Samples were analyzed for TCL/TAL+30 constituents. These results are presented in Table 6.

Several inorganic constituents were detected in supernatant from Lagoon 2, with concentrations generally in the low Ig/L (ppb) to mg/L (ppm) range. Volatile organic compounds semivolatile organic compounds, and pesticides were not detected in supernatant samples from the lagoon. The total PCB concentration for Lagoon 2 supernatant was 0.0024 mg/L.

Sediments

Sediment samples were taken from the North Ditch during both Phase I and Phase II of the RI. At each sample location, three discrete grab samples were collected from the upper six inches of sediment, at locations equally spaced across the stream or ditch. These discrete samples were then combined into a representative composite. At the center location, a deeper sample of the sediment, below six inches, was also collected. Five of the 16 deeper samples were further divided into two separate samples. All samples were analyzed for PCBS and TAL constituents.

A total of eight discrete surficial (upper six inches) sediment samples were collected from the North Ditch during the Phase II Investigation (May 18 to 20, 1993). Of these, three samples were collected from upstream locations in the North Ditch (i.e., west of the Nine Springs Plant). All sediment samples were analyzed for PCBS, TOC, and TAL constituents. Summaries of the Phase II sediment data and comparison to the representative background concentrations for the North Ditch are presented in Table 7.

Except for calcium, the inorganic constituents detected in the North Ditch were not significantly above background and calcium was only three times the upstream concentrations. PCBS were detected in the North Ditch with a maximum total PCB concentration of 0.44 mg/kg. However, PCBS also were detected in the North Ditch upstream samples at a maximum concentration of 1.85 mg/kg. The PCB concentrations detected upstream suggest that an up gradient source of PCBS exists and that the PCBS detected in the North Ditch may not be entirely site related. Alternatively, however, the presence of PCBS in sediment samples adjacent to the Lagoons Site may have been due to a reported sludge release during the 1970 dike failure. As such, and as requested by U.S. EPA, PCBS are considered a chemical of concern for sediments in the North Ditch. Since higher concentrations of PCBS were reported in upstream sediment samples, the potential risks posed by exposure to PCBS in North Ditch sediments will be characterized and evaluated by comparison with risks associated with upstream sediment PCB levels.

TABLE 5

Inorganic Analytes in Peat Samples

Inorganic Analytes	Observed Range ppm	No. of Samples Exceeding the SDL/Total Analyzed	Observed Range ppm	No. of Samples Exceeding the SDL/Total Analyzed
Aluminum	2,600 - 4,110	2/2	5,050 - 7,240	3/3
Arsenic	ND - 9.8	½	ND - 0.7	1/3
Barium	77.7 - 546	2/2	81.7 - 1,010	3/3
Cadmium	ND - 16.9	½	ND - 27.3	1/3
Calcium	29,500 - 46,700	2/2	25,000 - 46,300	3/3
Chromium	ND - 110	½	74.4 - 152	3/3
Copper	ND - 282	½	ND - 503	1/3
Iron	4,170 - 9,320	2/2	4,660 - 13,600	3/3
Lead	ND - 488	½	3.6 - 151	3/3
Magnesium	ND - 7,510	½	--	0/3
Manganese	76.4 - 199	2/2	102 - 271	3/3
Mercury	R - 18.3	1/1	R	N/A
Nickel	ND - 33	½	--	0/3
Selenium	ND - 4.4	½	ND - 8.2	1/3
Silver	ND - 60.5	½	--	0/3
Zinc	48.4 - 1,390	2/2	29.8 - 2,440	3/3
Cyanide	ND - 1.76	½	--	0/3

Volatile Organic Compounds in Peat Samples

Volatile Organic Compounds	Lagoon 1 Peat Observed Range ppm	Lagoon 1 Peat No. of Samples Exceeding the SQL/Total Analyzed	Lagoon 2 Peat Observed Range ppm	Lagoon 2 Peat No. of Samples Exceeding the SQL/Total Analyzed
Methylene Chloride	ND - 0.15B	1/4	BQL - 0.15B	3/6
Acetone	2.4 - 4.5	4/4	2.4 - 7.5B	6/6
2-Butanone	ND - 0.81B	3/4	BQL - 1.1	5/6
Toluene	BQL - 0.1B	1/4	BQL - 0.218B	1/6
Chlorobenzene	--	0/4	ND - 0.16	1/6
Xylenes (total)	ND - 0.41	3/4	ND - 0.91	3/6
Benzene	--	0/4	ND - 0.045	1/6
Carbon Disulfide	--	0/4	ND - 0.043	1/6

Notes:

SQL Sample quantitation limit.
-- All values are either estimated or reported as not detected.
B Report in the blank of the sample result noted.
BQL Below sample quantitation limit.
ND Not detected.

PEAT SAMPLING RESULTS FOR PCBS

	CRQL										
Location:		Lagoon 1A	Lagoon 1A	Lagoon 1A	Lagoon 1A	Lagoon 2	Lagoon 2	Lagoon 2	Lagoon 2	Lagoon 2	Lagoon 2
Sample No.		L1AT006A	L1AT006B	L1AAT008A	L1AT008B	L2T008A	L2T009B	L2T017A	L2T017B	L2T020A	L2T020B
Sample Date		3/5/91	3/5/91	3/5/91	3/5/91	3/5/91	3/5/91	3/5/91	3/5/91	3/5/91	3/5/91
Total Sludge Depth (ft):		4.0	4.0	5.0	5.0	5.5	5.5	3.5	3.5	3.7	3.7
Sludge Depth Sampled (ft):		0-0.8	0.8-1.6	0-0.8	0.8-1.8	0-0.8	0.0-1.6	0-0.8	0.8-1.6	0-1.0	1.0-2.0
PCBS (mg/kg)											
Correction Factor		4.0		6.3		5.0		7.1		6.3	
Aroclor 1242	0.080	2.9	N/A	U	N/A	2.8	N/A	U	N/A	U	N/A
Aroclor 1254	0.160	1.5	N/A	U	N/A	1.0	M/A	U	N/A	U	N/A
Aroclor 1260	0.160	U	N/A	U	N/A	U	N/A	U	N/A	U	N/A
Total PCBS		4.4	N/A	U	N/A	3.5	N/A	U	N/A	U	N/A

Notes:

N/A = Not analyzed.
U = Not detected. The sample specific quantitation limit can be determined by multiplying the CRQL by the sample correction factor. Aroclor 1016, 1221, 1232, and 1248 were non-detect for all samples analyzed.
CRQL = Contract Required Quantitation Limit.

TABLE 6

Inorganic Analytes in Supernatant Samples

Inorganic Analytes	Observed Range, ppm	No. of Samples Exceeding the SDL/Total Analyzed
Aluminum	ND - 0.48	2/3
Arsenic	ND - 0.0065	2/3
Cadmium	ND - 0.005	1/3
Calcium	39.7 - 49.8	3/3
Chromium	ND - 0.021	2/3
Copper	ND - 0.068	1/3
Iron	0.85 - 2.08	3/3
Lead	0.012 - 0.021	3/3
Magnesium	34.8 - 59.7	3/3
Mercury	0.0003 - 0.003	3/3
Nickel	ND - 0.048	2/3
Potassium	106 - 125	3/3
Silver	0.0014 - 0.014	3/3
Sodium	185 - 218	3/3
Zinc	0.06 - 0.284	3/3
Cyanide	ND - 0.163	2/3

Notes:

SDL Sample detection limit.

ND Not detected.

CONCENTRATIONS OF TCL CONSTITUENTS IN SUPERNATANT SAMPLES

Location:		Lagoon 1	Lagoon 1	Lagoon 2
Sample No.:		L1AP001C	L1BP001C	L2P001C
Sample Date:		11/14/90	11/14/90	11/14/90
Volatile Organics (ug/L)				
Correction Factor:		1.0	1.0	1.0
	CRQL			
2-hexanone	10	J	78	U
Toluene	5	J	U	U
PCBS (ug/L)				
Correction Factor:		1.0	1.0	1.0
Aroclor 1242	0.5	0.96	0.78	2.4
Total PCBS		0.96	0.78	2.4

Notes:

CRQL = Contract Required Quantitation Limit.

J = Estimated value.

U = Not detected. The sample specific quantitation limit can be determined by multiplying the CRQL by the sample correction factor.

TABLE 7

Inorganic Analytes in Sediment Samples

Inorganic Analytes	Nine Springs Creek Sediment Observed Background Range, ppm (NSE023 - 25)	Nine Springs Creek Sediment Observed Range ppm, (including background)	Nine Springs Creek Sediment No. of Samples Exceeding the SDL/Total Analyzed	North Ditch Sediment Observed Background Range, ppm (NDE017-19)	North Ditch Sediment Observed Range, ppm (including background)	North Ditch Sediment No. of Samples Exceeding the SDL/Total Analyzed
Aluminum	9,120 - 12,500	6,750 - 17,100	9/9	16,800 - 23,400	1,990 - 23,400	8/8
Arsenic	B - 9.6	B - 9.7	2/9	B - 11.3	B - 11.3	2/8
Barium	B - 115	B - 137	5/9	B - 421	B - 421	5/8
Calcium	31,800 - 41,500	31,800 - 91,900	9/9	21,300 - 44,000	21,300 - 126,000	8/8
Chromium	30.8 - 37.7	29.5 - 46.4	9/9	40.2J - 64.7J	6.8 - 64.7J	8/8
Copper	B - 16.2	B - 22.2	7/9	55.4 - 91.1	B - 91.1	6/8
Iron	13,000 - 14,500	9,870 - 18,700	9/9	27,500 - 39,300	5,600 - 39,300	8/8
Lead	17.8J - 25.5J	9.3J - 30.7J	9/9	51.9 - 108	28.7 - 108	7/8
Magnesium	11,500 - 15,600	6,440 - 15,660	9/9	8,200 - 21,400	8,200 - 21,400	8/8
Manganese	254 - 376	254 - 521	9/9	548 - 678	203 - 678	8/8
Mercury	b - 0.22	ND - 0.22	1/9	1.5 - 3.4	B - 3.4	7/8
Nickel	--	--	0/9	B - 32.2	ND - 32.2	3/8
Potassium	--	--	0/9	B - 2,160	B - 2,160	1/8
Selenium	R	ND - R	N/A	ND,J - R	ND,J - R	N/A
Silver	--	--	0/9	5.9 - 16.7	ND - 16.7	3/8
Vanadium	B - 30.9	B - 39.2	5/9	48.0J - 58.5	B - 58.5	3/8
Zinc	61.6J - 77.8J	50.3 - 106	9/9	334J - 576	75.8 - 576	8/8
Cyanide	ND - 0.21	ND - 0.21	2/9	0.18 - 8.4	ND - 8.4	4/8

Notes:

-- All values were either estimated or reported as not detected.
NA Not available.
ND Not detected.
B Concentration between the CRDL and IDL.
R Data rejected as a result of validation.
J Data estimated as a result of validation.
SDL Sample detection limit.
CRDL Contract Regional Detection Limit.
IDL Instrument Detection Limit.

Biota

In 1982, Wisconsin Department of Natural Resources (WDNR) performed PCB analysis on carp collected from four locations in Nine Springs Creek in the vicinity of the sludge lagoons. Carp are frequently used as indicators of bioaccumulation due to their high lipid content and bottom-feeding habits, and are thus considered to be maximally exposed to sediment constituents. Since carp are relatively non-migratory and long-lived, they are good indicators of site-specific constituent bioavailability. Total PCB (fillet composite) concentrations ranged from less than 0.2 to 0.58 mg/kg.

WDNR considered the PCB concentrations detected in the fish study to be representative of regional background conditions (MMSD, 1983; 1985; 1990a). According to the U.S. Fish and Wildlife Service (Eisler, 1986), low concentrations of PCBS are detected in fish from almost every major river in the United States. As such, the PCB concentrations detected in carp from Nine Springs Creek are within the range of regional background PCB concentrations for this species, and no chemicals of concern are identified in biota. A summary of regional carp PCB concentrations is presented in Section 2.1.6 of the Final RI Report (BBL, 1994b).

A summary of chemicals of concern for all media is presented in Table 8.

The approved RI Report (January 1994), contained the following conclusions:

- The peat acts as a capture zone that restricts migration of sludge constituents to the aquifer beneath the lagoons. Available data indicate that constituents present in the sludge are being captured and retained in the peat layer.

- Results indicate that ground water is not affected by the lagoon sludge constituents. No organic constituents which can be attributed to the lagoons were detected in the ground water. This is likely due, in part, to the restrictive geologic and hydrogeologic subsurface characteristics. Although fluctuations in the presence and concentration of inorganic ground-water constituents were noted, the range of upgradient (background) inorganic constituent concentrations was generally comparable to those reported in ground-water samples obtained from downgradient locations.

- Nine Springs Creek and North Ditch surface-water results indicate that no sludge constituents are migrating through the lagoon dike walls. The majority of the few TCL/TAL constituents observed in the surface water were also observed at similar concentrations in upgradient/upstream water samples. The lack of a good hydraulic connection between the lagoons and the surrounding streams was further substantiated by sampling of peat, following the cleanout of Lagoon 1B.

- No similar patterns between sludge and sediment constituents in samples obtained adjacent to, or downgradient of, the sludge lagoons can be discerned that indicate possible migration. Determination of the source of organic and inorganic constituents reported in the creek and ditch sediments is confounded by the presence of similar upstream constituents at comparable concentrations, analytical and spatial variability, and a 1970 dike failure. The slight increase in the concentrations of PCBS and several inorganic constituents in the North Ditch is likely related to the outflow of lagoon contents during the 1970 dike failure.

- The sludge lagoons, including the 1970 dike failure, have not affected the wetland soils adjacent to the North Ditch. Concentrations of inorganics detected in wetland soils were generally comparable to those noted in background.

TABLE 8

CHEMICALS OF INTEREST - SUMMARY OF ALL MEDIA

Parameter	Lagoon 2A Sludge	Post-Sludge Removal Pest Data	Supernatant Data	North Ditch Sediment Data
INORGANICS				
Aluminum	X			
Arsenic	X	X	X	
Barium	X			
Cadmium	X	X		
Chromium	X	X		
Cobalt				
Copper	X	X		
Iron	X		X	
Lead	X	X	X	
Magnesium	X		X	
Manganese	X		X	
Mercury	X	X	X	
Molybdenum		X		
Nickel	X	X		
Selenium	X	X		
Silver	X		X	
Vanadium				
Zinc	X	X	X	
Cyanide	X		X	
VOLATILE ORGANIC COMPOUNDS				
Acetone	X			
Carbon disulfide	X			
2-Butanone	X			
Benzene	X			
Toluene	X			
Chlorobenzene	X			
Ethylbenzene	X			
Xylenes (total)	X			
1,2-Dichloroethene	X			
SEMIVOLATILE ORGANIC COMPOUNDS				
Bis(2-ethylhexyl)phthalate	X			
PESTICIDES				
4,4-DDE	X			
4,4-DDD	X			
PCBS				
Total PCBS	X	X	X	X

Notes:

X - indicates the parameter is a chemical of interest in the media indicated.

Lagoon 2B Re-sampling (1996)

As noted previously, EPA indicated in a March 28, 1995 letter (Appendix C-10 that it no longer objected to the land application of MMSD's lagooned sludge containing PCBS at concentrations less than 50 ppm. To ensure that any sludge in Lagoon 2B which possibly contains PCBS in excess of 50 ppm not be inadvertently land applied, EPA requested additional sampling to better characterize the Lagoon 2B sludge. Guidance for conducting this sampling was provided to MMSD by EPA in a letter dated July 27, 1995 (Appendix C-2). sing the EPA guidance MMSD prepared and submitted to EPA a sampling plan, dated August 2, 1995 (Appendix C-3), for further characterizing the PCB concentrations in Lagoon 2B sludges. In a letter dated September 11, 1995 (Appendix C-4), EPA approved the sampling plan.

IV. SUMMARY OF SITE RISKS

During the course of an RI/FS the U.S. EPA requires that a risk assessment be prepared according to U.S. EPA policy and guidelines. At the MMSD Site, PRP contractors prepared a risk assessment under the Administrative Order for the RI and FS. This risk assessment provides U.S. EPA with a basis for selection of a remedy which would be protective of public health, welfare, and the environment. The risk assessment, prepared by the PRP contractor, utilizing available information is consistent with the U.S. EPA policy and guidance. It provides an estimate of the health or environmental problems that could result if the Site was left untreated. This analysis, commonly referred to as a baseline risk assessment, is documented in the Human

Health Risk Assessment and the Ecological Risk Assessment, September 1996 for the MMSD Site.

Toxicity Assessment

Cancer potency factors (CPFs) have been developed by EPA's Carcinogenic Assessment Group for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. CPFs, which are expressed in units of (mg/kg-day)-1, are multiplied by the estimated intake of a potential carcinogen in mg/kg-day and the expected duration of chronic exposure, to provide an upper-bound estimate of the excess lifetime cancer risk associated with exposure at that intake level. Values for these parameters are included in Table 8 for the chemicals used in the Risk Assessment. The term "upper bound" reflects the conservative estimate of risks calculated from the CPF. Use of this approach makes underestimation of the actual cancer risk highly unlikely. CPFs are derived from the results of human epidemiological studies or chronic animal bioassays to which animal-to-human extrapolation and uncertainty factors have been applied.

Reference doses (RfDs) have been developed by U.S. EPA for indicating the potential for adverse health effects from exposure to chemicals exhibiting noncarcinogenic effects. RfDs, which are expressed in units of mg/kg-day, are estimates of lifetime daily exposure levels for humans, including sensitive individuals. Estimated intakes of chemicals from environmental media (e.g., the amount of a chemical ingested from contaminated drinking water) can be compared to the RfD. RfDs are derived from human epidemiological studies or animal studies to which uncertainty factors have been applied (e.g., to account for the use of animal data to predict effects on humans). These uncertainly factors help ensure that the RfDs will not underestimate the potential for adverse noncarcinogenic effects to occur. Values for these parameters are included in Table 8 for the chemicals used in the Risk Assessment.

Pathways and Risk Assessment

Excess lifetime cancer risks are determined by multiplying the intake level with the CPF. These risks are probabilities that are generally expressed in scientific notation (e.g., 1 x 10-6). An excess lifetime cancer risk of 1 X 10-6 indicates that, as a plausible upper bound, an individual has a one in one million chance of developing cancer as a result of site-related exposure to a carcinogen over a 70 year lifetime under the specific exposure conditions at the site.

Potential concern for noncarcinogenic effects of a single contaminant in a single medium is expressed as the hazard quotient (HQ) (or the ratio of the estimated intake derived from the contaminant concentration in a given medium to the contaminant's reference dose). By adding the HQs for all contaminants within a medium or across all media to which a given population may reasonably be exposed, the Hazard Index (HI) can be generated. The HI provides a useful reference point for gauging the potential significance of multiple contaminant exposure within a single medium or across media.

The Baseline Risk Assessment identifies the potential for effects on human health and/or the environment that may result from exposure to chemicals present at the site under current conditions. The final Baseline Risk Assessment focuses on the sludge with PCB concentrations greater than or equal to 50 ppm. Sludge with PCB concentrations less than 50 ppm in other lagoon areas have previously been or will be cleaned out in the future in conjunction with the lagoon closure plan and the Metrogro program.

The Baseline Risk Assessment was developed in accordance with EPA guidelines, including the Risk Assessment Guidance for Superfund: Volume 1 - Human Health Evaluation Manual (EPA, 1989a) and Volume 2 - Environmental Evaluation Manual (EPA, 1989b). The Baseline Risk Assessment reflects potential risks posed by sludge only in 2A and portions of 2B and residual peat in Lagoons 1A, 1B, and the rest of 2B (i.e., assumes sludge is removed). The following sections present summaries of the human health and ecological portions of the Baseline Risk Assessment.

Human Health Evaluation

The human health evaluation portion of the Baseline Risk Assessment quantifies the potential human health risks posed by chemical constituents present at the MMSD Lagoons Site. The Human Health evaluation is organized into five general components: 1) Site Characterization; 2) Data Evaluation; 3) Exposure Assessment; 4) Toxicity Assessment; and 5) Risk Characterization.

Potential human receptor groups at the MMSD Lagoons Site were identified through evaluation of land use, accessibility, and definition of site activities. The potential receptors include those individuals who may come into contact with the sludge/peat and supernatant in the lagoons, sediments of the North Ditch, and/or ambient air affected by the lagoon areas. These individuals include MMSD employees, bird watchers, and local residents. Exposure routs vary by receptor group and environmental media, but generally include dermal contact, incidental ingestion, and/or inhalation. The various exposure routes (by receptor and media) used in the Baseline Risk Assessment, are presented below.

RECEPTOR	MEDIUM	EXPOSURE ROUTE
MMSD Employees	Lagoon 2A Sludge/Lagoon 1/2B Peat	Dermal Contact
	Lagoon Supernatant	Incidental Ingestion
	Ambient Air	Dermal Contact Inhalation of Organic Vapors
Bird Watchers	Lagoon 2A Sludge/Lagoon 1/2B Peat	Dermal Contact Incidental Ingestion
	Lagoon Supernatant	Dermal Contact
	Ambient Air	Inhalation of Organic Vapors
	Sediment	Dermal Contact Incidental Ingestion
Nearby Residents	Ambient Air	Inhalation of Organic Vapors

Consistent with EPA guidance, the potential for noncarcinogenic and carcinogenic effects are evaluated separately in the Human Health Evaluation. To characterize the overall potential for noncarcinogenic effects, an HI approach is used. An HI greater than 1 indicates the potential for adverse health effects. Carcinogenic risk is expressed as a probability of developing cancer over a lifetime. EPA's acceptable target range for carcinogenic risk associated with NPL sites is one-in-one-million (1E-06) to one-in-ten-thousand (1E-04).

In the Human Health Evaluation, HIs and carcinogenic risks were generated for each receptor and each pathway of exposure. A summary of the HIs and carcinogenic risks is presented below:

- Employees: Noncarcinogenic HIs for employees are well below the EPA target HI of 1. The overall carcinogenic risk for employees is 5E-06, which is within the EPA target risk range;

- Birdwatchers: Noncarcinogenic HIs for bird watchers are well below the EPA target HI of 1. The bird watcher's overall carcinogenic risk is 3E-06, which is within EPA's acceptable target risk range; and

- Residents: The carcinogenic risk for off-site residents is 3E-07, which is well below EPA's acceptable target risk range.

Ecological Assessment

The Ecological Assessment (EA) addresses the potential for ecological effects associated with the MMSD Lagoons Site. The EA is organized into the following four sections: 1) Site Characterization; 2) Exposure Assessment; 3) Ecological Effects Assessment; and 4) Risk Characterization.

Ecological exposure profiles were developed in the Exposure Assessment of the EA based on exposure potential, ecological significance, and/or sensitivity. Exposure profiles were developed for both the lagoon habitat and the adjacent North Ditch. Representative receptor species selected to evaluate the potential magnitude of exposure in the lagoon system habitats and the North Ditch included shorebirds (spotted sandpipers), great blue herons, shrews, and raccoons.

Wildlife exposure to PCBS via food consumption and ingestion of sludge/peat was estimated in the EA using exposure models and the methods presented in the EPA (1993) Wildlife Exposure Factors Handbook to determine the potential average daily dosage. Exposure variables for the EA were selected to represent two estimated degrees of exposure - a reasonable maximum estimate and a typical-case estimate. This approach allows for the presentation of a range of potential ecological risks, and is consistent with draft EPA guidance for performing ecological risk assessments under Superfund. Food item PCB concentrations used in the exposure models were estimated using bioconcentration factors (BCFs) and bioaccumulation factors (BAFs) obtained from the available literature.

To determine the potential risk for lagoon wildlife, estimated potential average daily doses were compared to appropriate toxicity endpoints. Toxicity endpoints included no-observed-adverse-effect-levels (NOAELs) and lowest-observed-adverse-effect-levels (LOAELs). NOAELs and LOAELs were obtained from toxicity data described in the literature. The estimated risks for wildlife receptors are presented as HQs, which are defined as the potential average daily dose divided by the NOAEL or LOAEL. EPA routinely considers a HQ of 1 as a benchmark for determining potential significance of calculated ecological risks.

In summary, as a result of discussion with EPA, PCBS were the only chemical considered in the ecological risk assessment. The only medium which resulted in HQ values greater than 1 under any scenario was Lagoon 2A sludge. The most conservative exposure and toxicity assumptions led to HQ values greater than 1 for shrews, sandpipers, and herons. In the more typical-case risk calculations for these receptors (i.e., typical exposure estimates and toxicity endpoints), none of the HQ values exceeded 1. HQ values for receptors exposed to other media (Lagoon 1 and 2B peat and North Ditch sediments) were all substantially less than 1.

V. DESCRIPTION OF ALTERNATIVES

RA-1 No Action

The No Action Alternative involves no active remediation or long-term management at the site. Implementation of the No-Action Alternative would result in discontinuation of currently ongoing dike monitoring, maintenance, and supernatant control. Lagoon 2A and the applicable portions of Lagoon 2B largely would remain in its current state, with future changes occurring only through natural processes such as biodegradation and increased vegetative cover. Inclusion of the No-Action Alternative is Required by the NCP as a basis against which action-related alternatives are evaluated. No costs are associated with this remedial action.

RA-2 Institutional Controls

This alternative would involve the continuation of current routine activities at Lagoon 2A and portions of 2B. These activities include supernatant control, periodic dike monitoring and routine dike maintenance (e.g. grading and maintaining dike roads). Any future changes that occur would be due to maintenance activities, or through natural processes such as biodegradation and continued growth of vegetative cover.

Physical barriers currently exist which limit access to the lagoons. These include fencing along the western end of Lagoon 1, and a creek and ditch which border the lagoons to the south, east, and north. Warning signs could be placed around the perimeter of the greater than 50 ppm PCB sludge to help further restrict access.

Monitoring of the perimeter containment dikes in the lagoon system is currently accomplished through the use of instrument clusters. Digital electronic readouts are obtained from the Sondex settlement system, used to measure settlement of compressible layers in the dike foundation. Digital electronic readouts also are obtained from the slope inclinometers which measure lateral movement within the soil layers underlying the dikes.

Lagoon supernatant levels are also currently regulated as part of MMSD's routine maintenance program. Piezometer water level measurements are obtained using a small diameter water level indicator to measure excess pore water pressures in the substrata. Ground-water monitoring wells facilitate the measurement of the water levels within the dikes using a conventional electronic water level probe. The frequency at which readings are taken has varied from twice per month to once per year, depending on the instrument and the trends observed from the previous readings. The institutional controls would continue in perpetuity. The estimated present worth cost of this alternative is approximately $425,000.

RA-3 Beneficial Reuse

The Beneficial Reuse alternative would involve the removal and recycling of sludge containing PCBS at concentrations greater than 50 ppm from Lagoon 2A and applicable portions of Lagoon 2B to agricultural land. Material to be removed from the lagoons would include vegetative cover, supernatant, sludge, and a limited amount of peat at the sludge/peat interface.

Prior to implementing this alternative, dikes would be constructed to isolate the Lagoon 2B sludge containing PCBS at concentrations above 50 ppm. The initial step in implementing the Beneficial Reuse alternative would involve segmenting the lagoons into smaller working units (cells), using intermediate dikes, to aid in the sludge removal. Vegetation covering the majority of Lagoon 2A and applicable portions of 2B would be removed and used as a soil condition. Sludge removal would be performed by directing sludge to a series of sumps located along the intermediate dikes.

From the sumps, the sludge would be pumped to an overhead loading station, for subsequent transportation. Sludge transportation to the field application site would be accomplished through the use of tanker trucks.

To ensure adequate removal of sludge, a layer of peat (approximately one foot, based on previous cleanout activities) at the sludge/peat interface also would be removed. The sludge/peat then would be beneficially reused on lands owned by the District or other nearby farmland.

It is anticipated that sludge clean out and beneficial reuse of greater than 50 ppm sludge would be completed in approximately six years. Following sludge removal, the lagoons could be actively managed to enhance and control future use by wildlife, or allowed to naturally revegetate and return to pre-lagoon conditions. Cost of the alternative is estimated to be $8 million.

RA-4 In-Place Vegetative/Soil Cover

The In-Place Vegetative/Soil Cover Alternative would involve the removal of supernatant from water-covered areas of Lagoon 2A and applicable portions of Lagoon 2B, followed by the placement of a geotextile layer and approximately one foot of a lightweight soil (e.g., peat) cover. The soil cover would be seeded with appropriate aquatic vegetation and Required maintenance activities implemented as necessary, to ensure continued vegetative growth and the development of a weed mat at the sludge surface. Remedial activities would involve only the areas of Lagoon 2A and applicable portions of 2B that are covered with supernatant (i.e., exposed sludge). These areas are expected to total approximately 30 percent of the affected surface since approximately 70 percent of it already is covered with vegetation, including a 6- to 12-inch weed mat.

Remedial activities would be performed during the winter so that the frozen ground could better support additional weight due to construction equipment and activity. In areas where construction activities would be performed surface water would be removed so that a minimum amount of surface water would be present before freezing. Supernatant would be periodically pumped from these areas, starting in late fall until the ground freezes. The removed supernatant would be pumped to the Nine Springs Treatment Facility for treatment.

Construction activities would commence with limited grading (if necessary) followed by the placement of a layer of geotextile on the frozen sludge surface to support a soil cover until the weed mat has had sufficient time to mature and support the cover. Geotextile placement would be followed by the placement of an approximately one-foot thick layer of light-weight soil material on tope of the geotextile. The soil would then be hydroseeded with appropriate native aquatic vegetation.

Following seeding, appropriate warning signs would be posed and the cover would be maintained to facilitate ongoing vegetative growth. Maintenance of dikes and other physical barriers would proceed as discussed preciously for the Institutional Controls Alternative (RA-2).

The implementation of the In-Place Vegetative/Soil Cover Alternative (RA-4) would affect approximately three acres of Lagoon 2A and approximately nine acres of Lagoon 2B. Construction would be complete in one season, while the development of a viable weed mat would require several seasons. Cost of the remedy is estimated to be $1.8 million.

RA-5 In-Situ Solidification/Stabilization

The In-Situ Solidification/Stabilization Alternative would involve the in-place addition of a binder to convert the sludge into a less soluble and less mobile form. A binding agent comprised of either a mixture of equal parts portland cement and Class C fly ash or only portland cement would be added to the sludge at a ration of 1:1 by weight. This mixture is based on results of the 1995 bench-scale study described in section 4.3.2. The mixture used in the 1989 study was deemed to be too conservative and hence not as economical. The binder would incorporate the sludge constituents in the resulting solid material. Based on the results of laboratory testing (Section 4.4), the intended mixture would provide adequate strength within several days of curing to provide the 10 pounds per square inch (psi) Required strength to support construction equipment.

The vegetation overlying the surface of the lagoons would not be removed during implementation of this alternative. Mixing would be performed to a minimum depth of approximately six feet, which would include treating a portion of underlying peat in addition to the sludge. A one-foot layer of lightweight soil material subsequently would be placed over the stabilized mass and vegetated, to help control ponding due to precipitation, reduce weathering, and enhance site aesthetics. At a treatment rate of approximately 700 cubic yards per day and a construction season of about six months, this project should be completed in approximately three years. The estimated present worth cost to implement this alternative ranges from approximately $23 million to $28 million.

Ongoing maintenance activities would take place at the site, including periodic dike monitoring and maintenance (e.g., grading and maintaining dike roads), and surface-water control if areas of persistent ponding are observed. The methods and approach to be used would be consistent with those in the Institutional Controls Alternative (RA-2) described in Section 5.3.2.

RA-6(a) Ex-Situ Biological Treatment - Reuse Residue

This alternative would involve the removal and biological treatment of sludge from Lagoon 2A and applicable portions of Lagoon 2B with PCB concentrations in excess of 50 ppm, to a PCB concentration of less than 50 ppm in biological reactors, following which the treated sludge would be recycled to agricultural lands. Materials removed from the lagoon would include vegetative cover, sludge, a small amount of supernatant, and a limited amount of peat at the sludge/peat interface. Vegetation which covers the majority of the lagoon, would be removed and used as a soil condition. The cover material would be tested prior to its use as a soil conditioner to confirm that the PCB concentration is below 50 ppm. Sludge would be pumped directly to the biological reactors for treatment.

During sludge removal operations, the dikes would be closely monitored. To ensure adequate removal of sludge, a layer of peat at the sludge/peat interface also would be removed. Following sludge removal, the cleaned out lagoon could be managed to allow continued use by shore birds, or allowed to naturally revegetate and return to pre-lagoon conditions.

The biological reactors would be constructed on MMSD property. An estimated 30 percent reduction would reduce the average Lagoon 2A and portions of Lagoon 2B sludge PCB concentration to below 50 ppm.

PCB biodegradation would be effected by naturally occurring microorganisms to a target concentration of less than 50 ppm. The necessary biochemical sludge characterization would be performed prior to detailed process design. As part of process control monitoring, moisture and nutrient levels (oxygen, phosphate and nitrate) would be periodically measured and maintained at specific design concentrations. Adequate aeration would be provided based on the pre-determined oxygen demand of the sludge.

Following treatment, the sludge would be recycled to agricultural land. It is estimated that the Ex-Situ Biological Treatment - Reuse Residue Alternative (RA-6[a]) would take approximately 15 years to complete. The estimated present worth cost of this alternative is in the range of $44 million to $66 million.

RA-6(b) Ex-Situ Biological Treatment - Landfill Residue

This alternative would involve the removal and biological treatment of sludge from Lagoon 2A and portions of Lagoon 2B to a PCB concentration of less than 50 ppm in a biological reactor consistent with RA-6[a], following which the treated sludge would be disposed in a solid waste landfill. Materials removed from the lagoons would include vegetative cover, sludge, a relatively small amount of supernatant, and a limited amount of peat at the sludge/peat interface.

Lagoon cleanout and sludge pre-treatment in biological reactors would be conducted as described for the Ex-Situ Biological Treatment - Reuse Residue Alternative (RA-6[a]). Following treatment to PCB levels less than 50 ppm, the sludge would be stabilized for disposal. Sludge would be treated to pass the paint filter test so that it is acceptable for disposal at a local Wisconsin solid waste landfill. It is estimated that the Ex-Situ Biological Treatment - Reuse Residue Alternative (RA-6[a]) would take approximately 15 years to complete. The estimated present worth cost of this alternative is approximately $64 million to $89 million.

Following sludge removal, the cleaned out lagoon could be managed to allow continued use by shorebirds, or allowed to naturally revegetate and return to pre-lagoon conditions.

RA-7 Ex-Situ Chemical Treatment - Landfill Residue

This alternative would involve the chemical treatment of sludge removed from Lagoon 2A and portions of Lagoon 2B to a PCB concentration of less than 50 ppm. Following treatment, the residual sludge solids would be disposed in a local solid waste landfill in a manner similar to the Ex-Situ Biological Treatment - Landfill

Residue Alternative (RA-6[b]). As with the other alternatives, the vegetative cover, sludge, a small amount of supernatant, and a limited amount of peat at the sludge/peat interface, would be removed.

Lagoon cleanout would be accomplished following the procedures described previously in Section 5.3.3. During sludge removal operations, the dikes would be monitored. Vegetation which covers the majority of the lagoon would be removed and used as a soil conditioner. Following sludge removal, the cleaned out lagoon could be managed to allow continued use by shorebirds, or allowed to revegetate naturally and return to wetland conditions.

Chemical treatment is B.E.S.T.(R) solvent extraction. The B.E.S.T.(R) mobile unit operates at a rate of up to 140 tons of wet sludge per day, using a solvent called triethylamine (TEA).

Following treatment, the sludge would be separated into three fractions: oil containing the PCBS, water, and dry solids. The concentrated PCBS contained in the organic oil fraction (liquid) would require disposal in an approved TSCA incinerator. The water would contain negligible PCBS and would be treated by the MMSD publicly owned treatment works (POTW). The sludge solids would be disposed of at a Wisconsin solid waste landfill. The removed pat would be stabilized with fly ash (if necessary) and also disposed of in a local solid waste landfill.

Assuming a construction season lasting 180 days per year, it would take approximately 14 years to treat the Lagoon 2A and applicable portions of Lagoon 2B sludge at a treatment rate of 140 tons of wet sludge per day. Present worth cost of this alternative is in the range of $55 million to $74 million.

RA-8 TSCA Landfill Disposal

This alternative would involve the removal, stabilization, and disposal of sludge from Lagoon 2A and portions of Lagoon 2B in an out-of-state, TSCA-permitted landfill. Materials removed from the lagoons would include vegetative cover, sludge, some supernatant and a limited amount of peat at the sludge/peat interface. Lagoons cleanout would be accomplished following previously described procedures. Following sludge removal, the cleaned out lagoon could be managed to allow continued use by shorebirds, or allowed to naturally revegetate and return to pre-lagoon conditions.

Vegetation, which covers the majority of the lagoon would be removed and used as a soil conditioner. During sludge removal operations, the dikes would be closely monitored.

The stabilized sludge would be transported to an out-of-state TSCA-permitted disposal facility. The sludge would be manifested and transported in accordance with applicable state and federal regulations. It is estimated that this alternative would take approximately six years to complete at a present worth cost estimated to be in the range of $160 million to $168 million.

RA-9 Wisconsin Solid Waste Landfill Disposal

The Solid Waste Landfill Disposal Alternative (RA-9) would involve the removal, stabilization, and disposal of sludge from Lagoon 2A and portions of Lagoon 2B in a Wisconsin solid waste landfill. Sludge removal, stabilization, and transport would be conducted in a manner consistent with that described for the TSCA Landfill Disposal Alternative (RA-8). However, disposal would take place in a local solid waste landfill that complies with Wisconsin Administrative Code Chapters NR 500 through 520 and is approved to accept such material from the WDNR and EPA. It is estimated that this alternative would take approximately six years to complete. The cost to implement this alternative is in the range of approximately $40 million to $53 million.

VI. COMPARATIVE ANALYSIS OF REMOVAL ALTERNATIVES

Based on current information, Alternative RA-4 appears to provide the best balance of tradeoffs among the alternatives with respect to the nine criteria that U.S. EPA uses to evaluate alternatives. This section profiles the performance of the preferred alternative against the nine criteria and explains the rationale for the section of the final remedial action. These nine criteria area:

1. Overall Protection of Human Health and the Environment addresses whether or not a remedy provides adequate protection and describes how risks posed through each pathway are eliminated, reduced, or controlled through treatment, engineering controls or institutional controls.

2. Compliance with ARARs addresses whether or not a remedy will meet all of the applicable or relevant and appropriate requirements (ARARs) of other Federal and state environmental statutes and/or provide grounds for invoking a waiver.

3. Long-Term Effectiveness and Permanence refers to the magnitude of residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time once the cleanup goals have been met.

4. Reduction of Toxicity, Mobility, or Volume is the anticipated performance of the treatment technologies that may be employed in a remedy.

5. Short-Term Effectiveness addresses the period of time needed to achieve remediation levels set out in the ROD, as well as the remedy's potential to create adverse impacts on human health and the environment that may result during the construction and implementation period, until cleanup levels are achieved.

6. Implementability is the technical and administrative feasibility of the remedy, including the availability of materials and services needed to implement the chosen solution.

7. Cost includes estimates of capital and operation and maintenance costs.

8. State Acceptance indicates whether, based on its review of the RI/FS and Proposed Plan, the State concurs with, opposes, or has no comment on the recommended alternative.

9. Community Acceptance will be assessed in the ROD following review of the public comments received on the RI/FS report and the Proposed Plan.

The 10 alternatives are being evaluated in relation to one another for each of the evaluation criteria. This evaluation identifies the relative strengths and weaknesses of each alternative. The No-Action Alternative (RA-1) will serve as a baseline for comparison. However, it should be noted that the Institutional Controls Alternative (RA-2) represents current site conditions. The alternatives that are undergoing a comparative analysis in this section, are as follows:

RA-1	No Action;
RA-2	Institutional Controls;
RA-3	Beneficial Reuse;
RA-4	In-Place Vegetative/Soil Cover;
RA-5	In-Situ Solidification/Stabilization;
RA-6[a]	Ex-Situ Biological Treatment - Reuse Residue;
RA-6[b]	Ex-Situ Biological Treatment - Landfill Residue;
RA-7	Ex-Situ Chemical Treatment - Landfill Residue;
RA-8	TSCA Landfill Disposal; and
RA-9	Wisconsin Solid Waste Landfill Disposal.

Overall protection of human health and the environment and compliance with ARARs are threshold requirements that each alternative must meet in order to be eligible for selection. The five primary balancing criteria are long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment; short-term effectiveness; implementability; and cost. State and community acceptance are modifying criteria that shall be considered in remedy selection.

Overall Protection of Human Health and the Environment

All of the alternatives are protective of human health. RA-3 and RA-6a provide protection of human health and the environment at the site through removal of contaminated sludge. These alternatives would eliminate:

(1) potential risks at Lagoon 2A and applicable portions of 2B associated with human and wildlife exposure to the lagoon sludge; (2) the potential for future migration of sludge from the lagoon; and (3) the potential need for long-term management at Lagoon 2A and portions of Lagoon 2B.

Protectiveness is achieved by Alternative RA-5 through reduction of the potential for human exposure and reduce wildlife exposure to greater than 50 ppm PCB lagoon sludge to acceptable levels by physically making the sludge constituents unavailable for ingestion, dermal exposure, or inhalation.

The in-place remedial alternatives protect human health by reducing or eliminating potential exposure pathways. Lagoon 2A sludge could pose an ecological risk to certain wildlife receptors if Alternative RA-1 or RA-2 was the selected remedy. Protectiveness is provided by the vegetative/soil cover in RA-4. RA-5 provides protectiveness by stabilizing the sludge to reduce the potential ecological risks to acceptable levels. RA-3 may pose concerns because it exceeds the 50 ppm standard for beneficial use, which is based on an analysis of acceptable risk.

Compliance with ARARs

Although no chemical-specific ARARs were identified that apply to municipal sewage sludge, federal and state guidance to be considered (TBCs) exists that may be considered for the remedial alternatives. Alternatives RA-2 through RA-9 are all expected to comply with the TBCs referenced in Appendix A, Table A-1. The No-Action Alternative (RA-1) may not comply with EPA guidance (EPA, August 1990), which states that Institutional Controls are warranted when low concentrations of PCBS remain on site.

With regard to action-specific ARARs (Appendix A, Table 2), the No-Action (RA-1) and Institutional Controls Alternatives (RA-2) are least apt to comply with 40 CFR Part 503 - Subpart C or NR 204, which specify municipal sludge management requirements. The action- specific ARARs identified for the In-Place Vegetative/Soil Cover (RA-4), In-Situ S/S (RA-5), and TSCA Landfill Disposal (RA-8) Alternatives are considered readily achievable. Implementation of the remove and treat, reuse and/or dispose (RA-3), RA-6[a], RA-6[b], RA-7) and Wisconsin Solid Waste Landfill Disposal (RA-9) Alternatives would all first require written approval from the Region 5 Administrator as an alternate disposal method under TSCA.

The location-specific ARARs identified in Appendix A, Table A-3 are considered readily achievable for Alternatives RA-2 through RA-9. In the absence of Institutional Controls, long- term compliance with NR 103 under the No-Action Alternative (RA-1) cannot be ensured.

Long-Term Effectiveness and Permanence

The two alternatives involving Beneficial Reuse (RA-3 and RA-6[a]) would result in the least residual risks at the site and the highest degree of long-term effectiveness of the nine alternatives evaluated. This is due to the removal and permanent treatment of the sludge, with no need for long-term monitoring/management. A similar level of effectiveness and permanence is also afforded at Lagoon 2A and applicable portions of Lagoon 2B, following implementation of the other removal alternatives (RA-6[b], RA-7, RA-8, and RA-9). however, they all involve landfilling of the removed sludge which poses a potential future long-term liability and hence would require monitoring to ensure continued, permanent and effective protection at the associated landfill.

The resistance to weather of the solidified/stabilized sludge mass (In-Situ S/S Alternative, RA-5) through cap and dike maintenance would result in long-term control (high-degree of permanence) of sludge migration and thus in a level of effectiveness that approaches that of the removal alternatives. The In-Place Vegetative/Soil Cover Alternative (RA-4) also would reduce the potential for human or wildlife exposure to greater than 50 ppm PCB sludge to acceptable levels for both human health and the environment. Through continued growth and thickening of the cap, the long-term effectiveness and permanence of Alternative RA-4 would improve over time. Ongoing monitoring and maintenance would be needed to ensure the long-term effectiveness of the In-Place Vegetative/Soil Cover (RA-4) and In-Situ S/S (RA-5) Alternatives.

Potential risks to certain wildlife receptors exist if Alternative RA-1 or RA-2 was selected for the lagoon sludge. In the absence of future dike monitoring/maintenance, access restrictions, and any actions taken to reduce the sludge exposure potential, Alternative RA-1 would offer the least degree of long-term effectiveness and permanence. In order to ensure long-term protection of wildlife that forage in Lagoon 2A and applicable portions of Lagoon 2B, continued growth and expansion of the vegetative cover over unvegetated areas would be necessary with Alternative RA-2.

With Alternative RA-1, RA-2, and RA-4, Lagoon 2A and the applicable portions of Lagoon 2B would continued to support most of the wildlife which currently utilize it. Exposure to the lagoon sludge could pose an ecological risk to certain wildlife receptors with Alternatives RA-1 or RA- 2. Future use of Lagoon 2A and the applicable portions of Lagoon 2B, following implementation of the In-Situ S/S Alternative (RA-5) would be limited primarily to terrestrial biota. If an Alternative involving removal of the lagoon sludge was implemented (i.e., RA-3, RA-6[a], RA-6[b], RA-7, RA-8, or RA-9), active management of the lagoons would allow future control to enhance the lagoons for use by wildlife.

Reduction of Toxicity, Mobility, or Volume

Reductions in mobility, volume, or toxicity would be realized through Alternative RA-6[a], since it involves removal and treatment. Similarly, all the alternatives involving removal and landfilling (RA-6[b], RA-7, RA-8, RA-9) would also result in reductions in mobility and potential toxicity but would result in an increase in disposal volume due to the addition of a stabilization agent (with the exception of RA-7, which is not expected to require addition of a stabilization agent). Alternative RA-5 would result in a reduction in potential mobility due to encapsulation and possible reductions in potential toxicity through treatment. The implementation of Alternative RA-5 would result in an increase in volume of the material in the lagoons.

Monitoring and maintenance for the In-Place Vegetative/Soil Cover and Institutional Controls Alternative RA-2 and capping for RA-4 would result in a reduction in the potential for future migration of sludge and its constituents. For the No-Action Alternative (RA-1), mobility would remain unaffected.

Short-Term Effectiveness

The No-Action Alternative (RA-1) provides for the lowest level of impact during implementation because the Alternative involves no action remediation. Implementation of the Institutional Controls Alternative (RA-2) would result in no additional potential risks and would take little additional time to implement since it represents current conditions at the Site. No modifications or disturbances to the current Lagoon 2A and applicable portions of Lagoon 2B ecosystem would result from implementation of RA-2.

Appropriate health and safety practices and engineering controls would be instituted that would adequately minimize potential exposure risks to workers during cap installation and operation and maintenance (O&M) activities associated with RA-4. Implementation time for this Alternative would take approximately one year. Since RA-4 would be implemented during one winter season and would not involve sludge removal, handling, or transport, short-term effects to the surrounding community or the environment would be minimal.

The implementation of Alternative RA-5 poses potential risk to workers and the surrounding environment through exposure to sludge constituents during implementation. Access restrictions and site monitoring would be instituted to minimize the potential for community exposure during implementation. Engineering controls and appropriate health and safety practices would be implemented to ensure worker protection during remedial activities and a monitoring program would be implemented to reduce the potential for environmental exposure during the estimated three-year construction period.

Of the alternatives involving removal, Alternative RA-3 presents the least short-term potential risks. This is due in part, to the controls used in the process. Sludge is transported short distances in fully-enclosed tanker trucks, is injected directly into the ground (substantially limiting human contact with sludge), and is performed by MMSD using experience obtained over two decades of land application practice. Additionally, RA-3 is one of the alternatives with the shortest implementation time (up to six years) of all the removal-related alternatives.

Alternatives RA-6[b], RA-7, RA-8, and RA-9 take longer to implement, with biological alternatives taking approximately 15 years, the chemical treatment/disposal Alternative taking 14 years, and the removal/disposal options taking approximately six years to complete. Potential exposure to workers and the environment during sludge treatment and stabilization would need to be managed through engineering controls and proper health and safety practices. Off-site disposition of the sludge would involve both transportation and additional handling, that would result in an increased potential for human exposure and environmental impacts. For Alternatives RA-6[b], RA-7, RA-8 and RA-9, an appropriate Health & Safety Plan with selected traffic routes identified would minimize adverse effects related to transporting stabilized sludge to the landfills.

Implementability

Alternatives RA-1, RA-2, and RA-4 present no implementability concerns and are technically and administratively feasible alternatives, requiring no special permits or approvals. Alternative RA-1 does not require that any remediation be performed. Since RA-2 has been ongoing at the site for several years, no concerns regarding implementation of RA-2 exist. Alternative RA-4 involves activities such as supernatant control and placement of fill, over applicable portions of Lagoon 2A and Lagoon 2B, which could be conducted using readily available equipment and materials.

Alternatives RA-5 and RA-8 are technically and administratively feasible and require no State/Federal special permits or approvals. However, specialized equipment and labor are Required to implement Alternative RA-5, while implementation of Alternative RA-8 is dependent upon acceptance of the greater than 50 ppm PCB sludge by a TSCA landfill facility and availability of landfill space.

Alternative RA-3 is considered technically implementable. Although never implemented full-scale using biological reactors, Alternative RA-6[a] is also technically feasible. Several operational challenges (e.g., mixing, aeration, pumping, etc.) could make RA-6[a] difficult to implement. In terms of administrative feasibility, both alternatives (RA-3 and RA-6[a]) would require EPA Region 5 approval as an alternate treatment disposal technology. Implementation of either Alternative RA-3 or RA-6[a] also is dependent upon acceptance of the Lagoon 2A sludge by farmers.

Alternatives RA-6[b], RA-7 and RA-9 require available landfill space. Similar to Alternative RA-6[a], several operational challenges make RA-6[b] difficult to implement. Alternative RA-7 would require specialized equipment and available incineration capacity for extracted PCB- containing oils. Public concern regarding landfilling of TSCA-regulated materials in Wisconsin could affect the implementability of Alternatives RA-6(b), RA-7, and RA-9.

Cost

Costs have been developed to reflect a +50 percent to -30 percent range of accuracy. These cost estimates are based on current information. The following table presents the estimated present worth costs for the alternatives.

ALTERNATIVE		ESTIMATED PRESENT WORTH COST
RA-1	No Action	-0-
RA-2	Institutional Controls	$425,000
RA-4	In-Place Vegetative/Soil Cover	$1,800,000
RA-3	Beneficial Reuse	$8,800,000
RA-5	In-Situ Solidification/stabilization	$23,000,000 - $28,000,000
RA-9	Wisconsin Solid Waste Landfill Disposal	$40,000,000 - $53,000,000
RA-6[a]	Ex-Situ Biological Treatment - Reuse Residue	$44,000,000 - $66,000,000

RA-7	Ex-Situ Chemical Treatment - Landfill Residue	$58,000,000 - $73,000,000
RA-6[b]	Ex-Situ Biological Treatment - Landfill Residue	$64,000,000 - $89,000,000
RA-8	TSCA Landfill Disposal	$164,000,000 - $168,000,000

The three least costly alternatives are No Action, Institutional Controls and In-Place Vegetative/Soil Cover, which are all in-place alternatives. Of the removal alternatives, Beneficial Reuse is the least costly. The other removal alternatives are between four and 17 times more costly than Beneficial Reuse and all by RA-6[a] involve a landfill disposal component.

In terms of landfilling, it should be noted that the cost of the Wisconsin Solid Waste Landfill Disposal Alternative (RA-9) is based on disposal costs estimated by commercial landfills, which are currently pursuing permit approval from WDNR to accept sediment with greater than 50 ppm PCBS. Since disposal of materials with PCBS at concentrations greater than 50 ppm in Wisconsin landfills has not been started, the actual price charge at the time of such landfilling may differ from the estimate used herein.

Cost for the alternatives involving sludge stabilization prior to disposal (RA-6[b], RA-7, RA-8, and RA-9 were developed based on a target solids content of 25 percent. Pending the results of treatability studies performed prior to implementation, these costs are subject to change.

State Acceptance

The State of Wisconsin has indicated that it concur with the selected remedy for the MMSD site. A letter from the WDNR indicating this support is attached.

Community Acceptance

In general, the community accepts the selected remedy. Comments from both the residents of the local community and the regulated community are addressed in the Responsiveness Summary which is attached.

VII. SELECTED REMEDY

The FS examined nine alternatives, and evaluated them according to the evaluation criteria outlined in the NCP. From these alternatives, U.S. EPA has selected Alternative RA-4 for remediation of the MMSD site. The Alternative includes:

! Construction of dikes to isolate areas of Lagoon 2B containing sludge with greater than 50 ppm PCBS;

! Placement of a geotextile layer and approximately one foot of lightweight soil cover over areas of Lagoon 2A and Lagoon 2B not already cover by naturally developed vegetative cover, and removal of supernatant from water-covered areas of Lagoon 2A and appropriate portions of Lagoon 2B as necessary;

! Seeding of these areas with aquatic vegetation and monitoring and maintenance to ensure continued vegetation growth; and

! Continuation of institutional control as described for Alternative RA-2.

Prior to cover placement, the sludge in Lagoon 2B with PCBS greater than 50 ppm first would be isolated with dikes. The Lagoon 2B sludge would then be consolidated to an area adjacent to Lagoon 2A so that all sludge with greater than 50 ppm PCBS would be contiguous. The In-Place Vegetative/Soil Cover Alternative (RA-4) would involve the removal of supernatant from water-covered areas of Lagoon 2A and applicable portions of Lagoon 2B, followed by the placement of a geotextile layer and approximately one foot of a lightweight soil (e.g., peat) cover. The removed supernatant would be pumped to the Nine Springs Treatment Facility for treatment. The soil cover would be seeded with appropriate aquatic vegetation and Required maintenance activities implemented as necessary, to ensure continued vegetative growth and the development of a weed mat at the sludge surface. The purpose of Alternative RA-4 would be to minimize potential exposure by humans and ecological receptors to the Lagoon 2A and applicable portions of Lagoon 2B sludge. Remedial activities would involve only the areas of Lagoon 2A and applicable portions of 2B that are covered with supernatant (i.e., exposed sludge). These areas are expected to total approximately 30 percent of the affected surface since approximately 70 percent of it already is covered with vegetation, including a 6 to 12-inch weed mat.

Following seeding, appropriate warning signs will be posed and the cover will be maintained to facilitate ongoing vegetative growth. Maintenance might involve the removal of any supernatant ponding that potentially could limit vegetative growth and the placement of minimal amounts of soil material over areas with any significant pooling. Dike maintenance, including monitoring and regular grading of dike roads will proceed on a regular basis.

The implementation of the In-Place Vegetative/Soil Cover Alternative (RA-4) is expected to affect approximately three acres of Lagoon 2A and approximately nine acres of Lagoon 2B. Construction is expected to be complete in one season, while the development of a viable weed mat would require several seasons.

VIII. STATUTORY DETERMINATIONS SUMMARY

1. Protection of Human Health and the Environment

The selected remedy protects human health and the environment by reducing the potential risks associated with exposure to sludge constituents. The existing vegetative cover and the placement of vegetative cover over areas of exposed sludge in sections of Lagoon 2A and applicable portions of Lagoon 2B would reduce the potential for human exposure through dermal contact, ingestion, and inhalation. The potential for wildlife exposure to lagoon sludge via food consumption and direct sludge contact would be reduced from pre-remediation conditions by the augmented vegetative cover. Long-term dike monitoring/maintenance activities will insure that sludge continues to be adequately contained within the lagoons.

Short-term risks associated with the construction of the cap will be managed through the use of good engineering practice and appropriate monitoring.

2. Attainment of ARARs

The selected remedy will be designed to meet all ARARs of Federal and more stringent state environmental laws. The following discussion provides the details of the ARARs that will be met by the selected Alternative.

Action-Specific ARARs:

Clean Water Act (CWA) of 1977, as amended [33 U.S.C. 1251)

40 CFR Part 122 and 40 CFR Part 125 - The National Pollutant Discharge Elimination System (NPDES), which specifies the scope and details of the NPDES permit applications, including limitations, standards, and other permit conditions which are applicable to all permits including specified categories of NPDES permits. It also specifies schedules of compliance and requirements for recording and reporting monitoring results.

40 CFR Part 403 - establishes responsibilities to implement National Pretreatment standards to control pollutants which pass through or interfere with treatment processes in POTWs or which may contaminate sewage sludge.

40 CFR Part 230 - provides guidelines to restore and maintain the chemical, physical, and biological integrity of waters of the United States through the control of discharges of dredged or filled material.

Occupational Safety and Health Act (OSHA)

40 CFR Part 1910 - Establishes requirements for worker health and safety.

Sewerage Sludge Use and Disposal Standards

40 CFR Part 503 - Establishes requirements for the final use and disposal of sewerage sludge with less than 50 ppm PCBS.

Wisconsin Act NR 204, Municipal Sludge Management

Regulates land application of municipal sludge and overall sludge disposal. Establishes standards and monitoring requirements for the use and disposal of municipal and domestic wastewater sludge.

Location-Specific ARARs

Wisconsin Act NR 103, Water Quality Standards for Wisconsin

Establishes water quality standards for wetlands.

To Be Considered

Guidance on Remedial Actions for the Superfund Sites with PCB Contamination, OSWER Directive No. 9355.4-01, August 1990

Presents guidance in selecting action/cleanup levels including TSCA PCB Spill Cleanup policy.

3. Cost Effectiveness

The selected remedy provides the best balance of the nine criteria and overall cost effectiveness of the protective remedies evaluated in the FS. Effectiveness is achieved by containment of the sludge with PCB concentrations greater than 50 ppm in Lagoon 2A and Lagoon 2B and continuing monitoring and maintenance of dikes, and development and growth of the vegetative cover. Permanence of the remedy is achieved by land-use restriction and continuing maintenance within the area of activity of the MMSD plant and facility. The selected remedy affords effectiveness and permanence at a cost which is proportional to the benefits achieved. Cost of the selected remedy is at a minimum an order of magnitude below the cost of other remedies described in the FS which offer marginal betterment.

4. Utilization of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable

The selected remedy provides the best balance with respect to the nine evaluation criteria as described in Section VI of this ROD. The selected remedy uses permanent solutions and Alternative treatment technologies or resource recovery technologies to the maximum extent practicable and provides the best balance of tradeoffs among alternatives in terms of the primary balancing criteria. State and community support for the selected remedy contributes to this balance of tradeoffs. Additionally when measured against costs of other remedies analyzed in the FS, the selected remedy provides the best balance.

5. Preference for Treatment as a Principal Element

The selected remedy does not meet the preference for treatment as a principal element. Opportunity for treatment is limited by the large volume of material with low levels of contamination present on site. No "hot spots" have been identified which would lend themselves to treatment. Cost for remedies, where treatment is a principal element, (which are similarly effective) are less cost effective than the selected remedy. As discussed in Section VI and this section the selected remedy is protective, ARAR compliant, effective, and cost effective.

RESPONSIVENESS SUMMARY
MADISON METROPOLITAN SEWERAGE DISTRICT SITE

Overview

On November 19, 1996, the United States Environmental Protection Agency (U.S. EPA) proposed a remedial Alternative which addressed contamination at the Madison Metropolitan Sewerage District (MMSD) site, Dane County, Wisconsin. The Alternative, as specified in the proposed plan, called for construction of a vegetative cover system in lagoon areas not already covered with naturally developing vegetative cover. The remedy was projected to be constructed over one winter season to facilitate access to lagoon areas. In addition, the MMSD proposed plan Required long term monitoring and maintenance of the covered lagoon areas and the dikes which enclose the areas in which contaminated sludge is located.

This Responsiveness summary addresses the concerns expressed by the public and the potentially responsible parties in written and oral comments received by U.S. EPA on the proposed cleanup plan for the MMSD site.

Summary of Comments Received During the Comment Period

Comments Which Support the Proposed Remedy

Oral comments received at the public meeting and written comments received during the 30 day comment period which ended December 18, 1996 strongly supported the proposed remedy for the MMSD site. Favorable comments were received from a cross-section of the community which is served by the MMSD wastewater treatment plant including local residents, business owners, faculty of the University of Wisconsin, representatives of the Dane County Regional Planning Commission, and administrators from the nearby communities of DeForest and Fitchburg which are served by MMSD. The general view of these commenters is that the proposed remedy is a cost-effective cleanup which is protective of human health and the environment and among other things is consistent with the objectives and policies of the Dane County Water Quality Plan, which is the area-wide water quality management plan for the region.

Comments Which Support Other Alternatives

Comment: A commenter favored Alternative RA-8, TSCA Landfill Disposal. The commenter favors the most costly Alternative because it offers comprehensive protection of area wildlife and human health and eliminates the need for restriction of land use. The commenter was also concerned that RA-4, the proposed Alternative, did not adequately consider the impact of flooding and other catastrophic conditions and their effects on the movement of contaminants.

U.S. EPA Response: U.S. EPA evaluates all alternatives according to criteria established to compare cleanup alternatives at Superfund sites. As a result of this analysis more than one alternatives may meet the threshold requirements for protectiveness and compliance with applicable or relative and appropriate Federal and State requirements and may be equally effective and implementable. In order to propose an appropriate remedy U.S. EPA must compare the cost effectiveness of each of these alternatives.

Analysis of alternatives for the MMSD site indicates that several other alternatives, in addition to the proposed Alternative RA-4, meet the threshold requirements and are effective and implementable. U.S. EPA has compared the costs of these alternatives. Although no more than equally protective, estimated costs of other alternatives are from ten to one hundred times greater than the cost of the proposed Alternative. U.S. EPA has proposed Alternative RA-4 based on analysis of its cost-effectiveness.

The proposed Alternative provides monitoring and maintenance requirements to prevent release of contaminants from the lagoon areas. These requirements include control of water levels in the lagoon area to ensure the integrity of the vegetative cover and prevent release during periods when local surface water levels may be high. Levels will be maintained by removal of excess water and treatment at the MMSD facility.

<IMG SRC 97156D>

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

Tommy G. Thompson, Governor Box 7921

George E. Meyer, Secretary
101 South Webster Street
Madison, Wisconsin 53707-7921
TELEPHONE 608-266-2621
FAX 608-267-3579
TDD 608-267-6897

March 31, 1997 IN REPLY REFER TO: MMSD-FID#113192970

Mr. Valdas V. Adamkus, Administrator
U.S. EPA Region 5
77 West Jackson Boulevard
Chicago, Illinois 60604

SUBJECT: Concurrence on Record of Decision, Madison Metropolitan Sewerage District Lagoon Superfund Site, City of Madison, Dane County, Wisconsin

<IMG SRC 97156E>

Dear Mr. Adamkus:

This letter documents concurrence with the Record of Decision developed for the Madison Metropolitan Sewerage District (MMSD) Lagoon Superfund Site by the Environmental Protection Agency. The Department concurs with the conclusions reached with respect to the environmental investigation conducted at the site, and with the results of the remedial option selection process.

The remedial investigation conducted at MMSD determined that the contaminants of concern have not adversely impacted groundwater, surface water or wetland soils at the site. Evaluation of ten possible remedial options for the MMSD site resulted in the selection of the "In Place Vegetative/Soil Cover" remedy. This remedial option involves the consolidation of all sludges with polychlorinated biphenyl compound (PCB) concentrations greater than 50 parts per million within existing berms and dikes, and the incorporation of a vegetated matt cover over their surface. Maintenance, monitoring and supernatant removal will be conducted by the Madison Metropolitan Sewerage District. The estimated present worth cost of the remedy is $1,800,000. Five years after the commencement of remedial action, a site review will be conducted to assure that the selected remedy is protective of human health and the environment.

Thank you for your efforts and cooperation in addressing the environmental contamination at the MMSD superfund site. State staff will continue to work in close consultation with EPA staff during the remedial design and construction phases of the remedy.

Should you have any questions regarding this site please contact Joe Brusca, Air and Waste Leader, in the South Central Region at (608)275-3296.

Sincerely,

<IMG SRC 97156F>

cc: Jay Hochmuth, AD/5
Mark Giesfeldt, RR/3
Dale Ziege, RR/3
Linda Meyer, AD/5
Ruth Badger, SCR
Joe Brusca, SCR

ADMINISTRATIVE RECORD INDEX
MADISON METROPOLITAN SEWERAGE DISTRICT SITE
DANE COUNTY, WISCONSIN

PAGES	DATE DOCNUMBER	TITLE	AUTHOR	RECIPIENT	DOCTYPE
3	1/28/87	Federal HRS,MMSD Sludge Lagoon	M. Williams	M. Giesfeldt	Correspondence
8	4/1990	Response to Comments	USEPA		Correspondence
29	11/13/86	HRS Scoring Package	Dave Curnock		Other
		Community Relations Plan MMSD Site, Dane Co. WI	USEPA		Other
48	9/24/92	Administrative Order on Consent re: Remedial Investigation/Feasibility Study and Design	USEPA		Pleadings/Orders
123	1/1994	Remedial Investigation Report Vols. I&II, appen.	Blasland, Bouck & Lee	USEPA	Reports/Studies
115	9/1996	Feasibility Study Report	Blasland, Bouck & Lee	USEPA	Report/Studies
24	9/1996	Human Health Risk Assessment	Blasland, Bouck & Lee	USEPA	Reports/Studies
23	9/1996	Ecological Risk Assessment	Blasland, Bouck & Lee	USEPA	Reports/Studies
2	7/27/95	Letter re: Sampling sludges <50 ppm PCB	J. Connell	J. Nemke, MMSD	Correspondence
18	8/2/95	Letter re: PCB Characterization of Lagoon 2B	D. Taylor, MMSD	J. Connell, USEPA	Correspondence
1	9/11/95	Letter re: approval sampling in Lagoon 2B	J. Connell, USEPA	D. Taylor, MMSD	Correspondence
95	4/16/96	Letter re: PCB Sampling in Lagoon 2B	D. Taylor, MMSD	USEPA	Correspondence

3	12/29/95	Letter re: halt usage of sludges W/PCB conc. <50ppm in Metrogrow	A. Adamkus, USEPA	J. Nemke, MMSD	Correspondence
3	3/28/95	Letter re: Sludges w/PCB conc. <50 ppm	A. Adamkus, USEPA	J. Nemke, MMSD	Correspondence
96	9/1992	Alternative Army Document	Blasland, Bouck & Lee	USEPA	Reports/Studies
96	4/1993	RI Phase II Field Sampling Plan/QAPP/Health and Safety Plan	Blasland, Bouck & Lee	USEPA	Reports/Studies
40	2/1992	Groundwater Characterization Report	Blasland, Bouck & Lee	USEPA	Reports/Studies
37	11/27/96	Transcript of Public Meeting held 11/19/96	T. Anderson, Verbatim Reporting Service	USEPA	Transcript
8	11/18/96	Proposed Plan	USEPA		Fact Sheets

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